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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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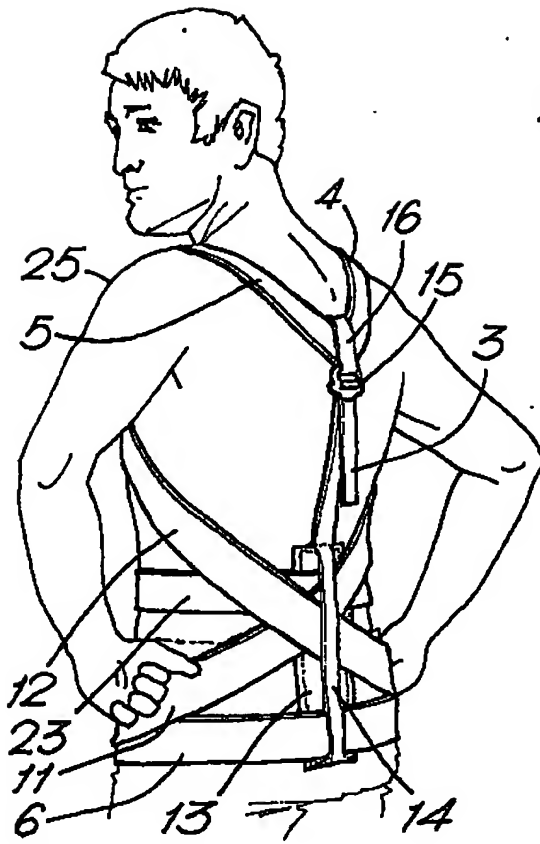


Fig. 2.

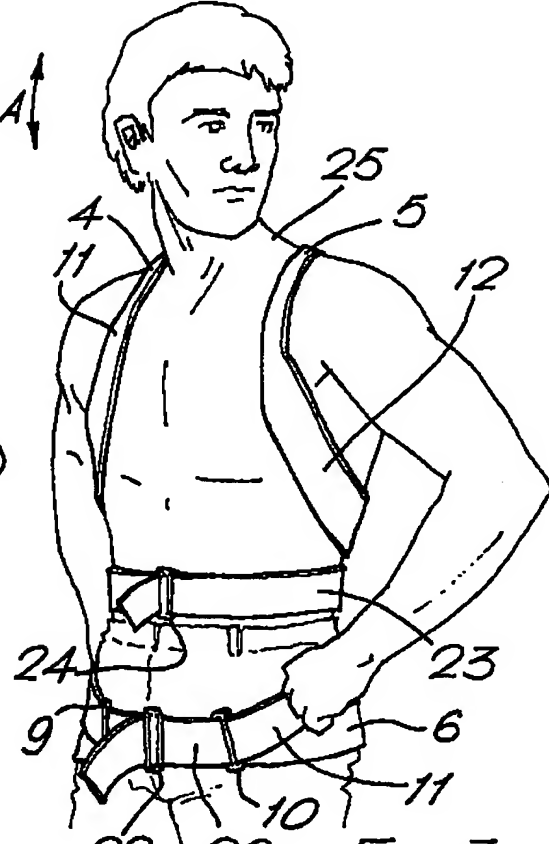


Fig. 3.

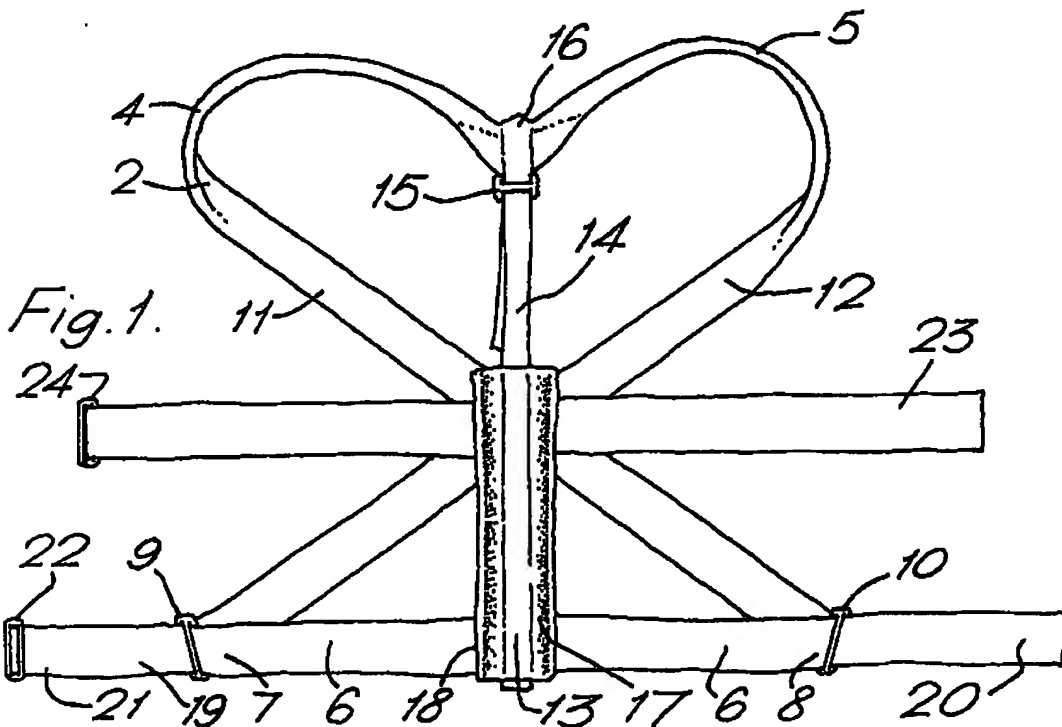
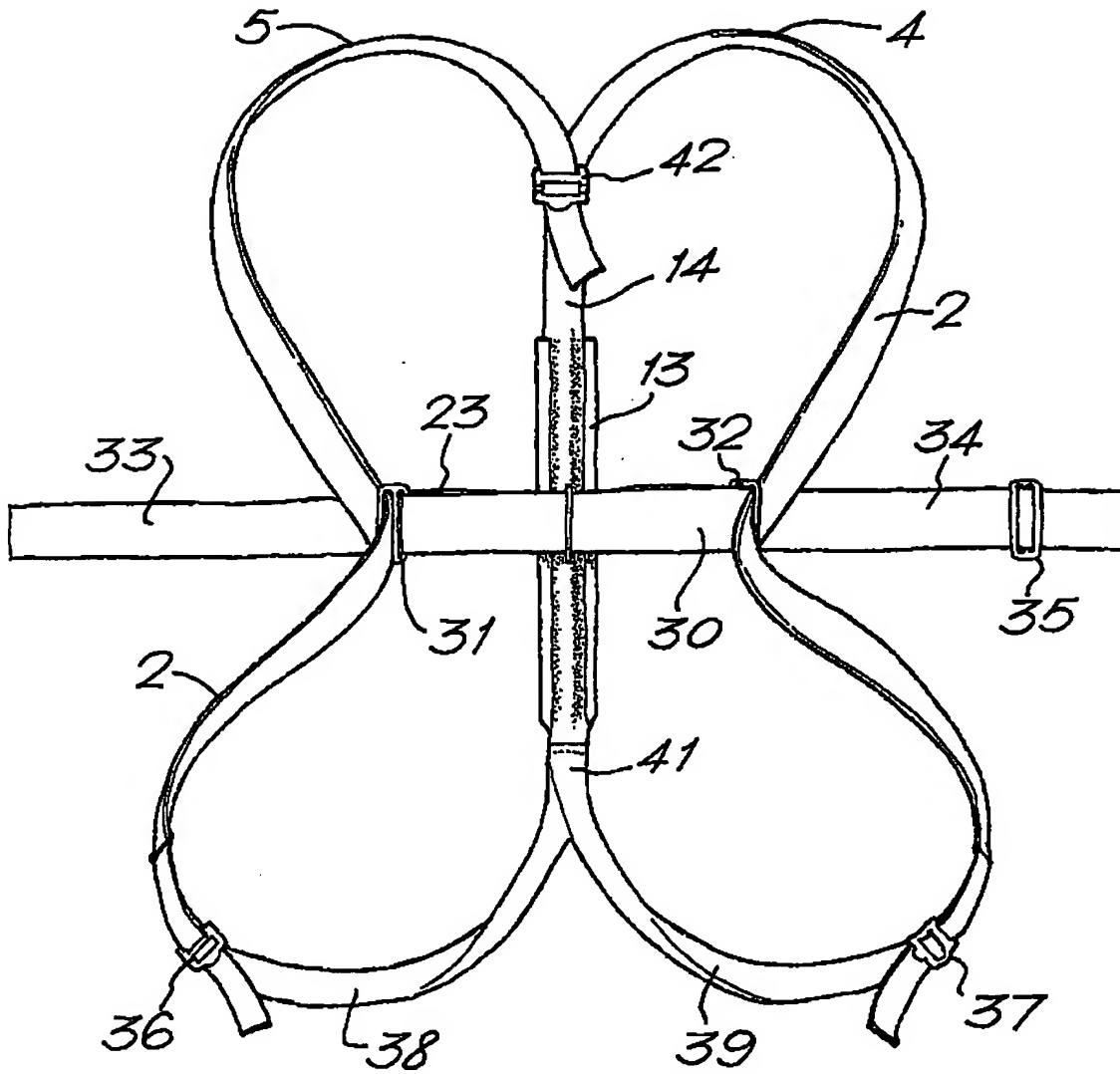
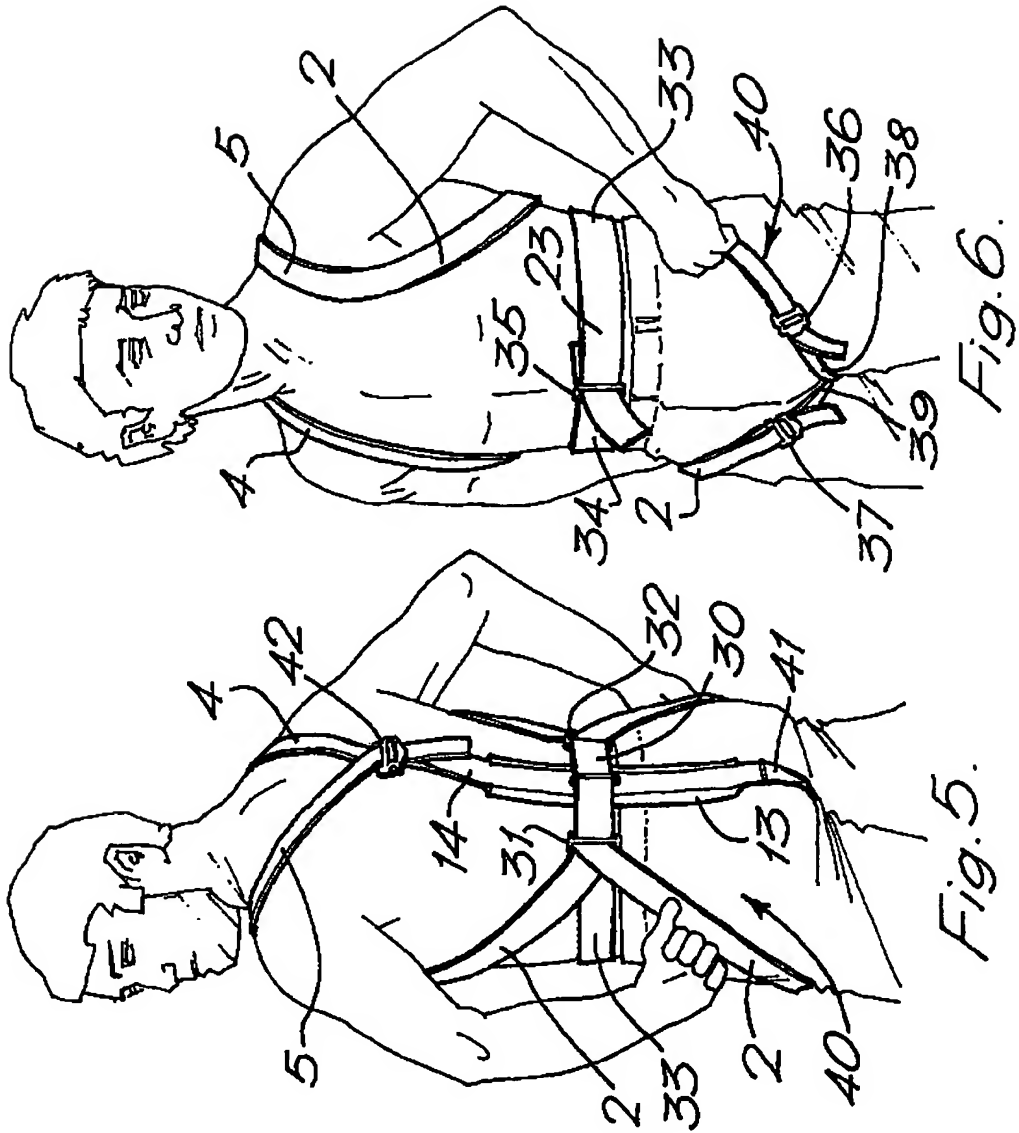


Fig. 1.

*Fig. 4.*



SPECIFICATION

A spinal support

This invention relates to a support for the spine.

5 The basic structure of the human body is the musculo-skeletal system which houses the other systems by which a human being exists and functions.

10 The musculo-skeletal system is made up of bones and connective tissue which is generally called ligaments and muscles. Bones are rigid structures although live bones have some resilience. The bones meet at their extremities forming joints and are held together by ligaments, which are made of flexible fibrous tissue thus permitting movement.

15 Overlying the joints are muscles which, by virtue of their ability to contract and expand, can cause controlled movements at the joints.

20 The bones make up the skeleton which consists of a central column known as the spine, an incomplete boney circle at the upper end known as the shoulder girdle and a complete strong boney circle at the lower end — the pelvic girdle.

25 The spine is made up of blocks of bones, one on top of the other and held together by ligaments. Each block is known as a vertebra. There are thirty-three vertebrae in all, the first twenty-four of which make up a flexible column from the nape of the neck to the small of the back, the next five are fused to form the sacrum, to which the pelvic girdle is attached and the last four form a vestigial tail, known as the coccyx. The flexible column comprises 30 seven cervical vertebrae, twelve thoracic vertebrae and five lumbar vertebrae. Between each pair of vertebrae is a flat circular piece of tissue, soft in the centre and solid around the edge, which is known as the Intervertebral Disc. Its purpose is to act as a shock absorber. Extending rearwards from the body of each vertebra are bars of bone which join to form a circular ring. These rings, joined by ligaments, 35 form a canal down through which passes the spinal cord, from which nerves pass outwards between the boney bars at the level of each vertebra.

40 The bodies of the vertebrae are held together by local ligaments and also by two long linear ligaments, one passing and attached in front of, and the other at back of, the body of each vertebra and extending the full length of the spinal column. 45 Overlying the spinal column is a complicated system of muscles controlling movement.

50 Viewed from the front the spine is straight. Viewed from the side it forms an 'S' shaped gentle curve concave to the rear in lower part and concave to front in the upper part. Movement is permitted backwards, forwards and sideways and in a rotary direction. Excessive movements cause strain on the 55 ligaments which causes them to swell and this swelling puts pressure on the nerves so causing pain and muscle spasm. More excessive movements, particularly if sudden, causes displacement and eventually to tearing of these ligaments particularly the posterior long ligaments 60 which then allows the Intervertebral disc to protrude backwards causing further severe pressure on the

65 nerves. This is the acute condition known as "slipped disc".

Other conditions, for example infections, can soften and weaken the ligaments, and muscle wasting conditions which have a similar effect, can result in spinal injuries.

70 In general, musculo-skeletal system is subjected to many and varied stresses and strains during its existence, particularly to the areas of the spine and these result in recurring and eventually chronic weakness, which necessitate supportive measures as well as other treatments. In particular spinal nerve root pain can be greatly relieved by the maintenance of good posture.

75 Supports for the spine are known which are of a corset type, however these are of a complicated structure and uncomfortable in warm weather.

80 Thus, it is an object of the present invention to provide a support for the spine which is relatively simple in construction and which has a small area of body contact so as to minimise discomfort during warm weather.

85 According to the invention there is provided a spinal support comprising a pelvic harness and a pair of shoulder straps each forming a loop extending in use from the lower back region of the user upwardly and forwardly around a respective side of the user to the front of a respective shoulder and then rearwardly over the shoulder to the upper back region, each shoulder strap at both the upper and lower back regions being attached to the pelvic harness for applying a rearward force on each shoulder.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which;

Figure 1 is a plan view of a support for the spine according to a first embodiment of the invention,

Figure 2 is a rear perspective view of the support of Figure 1 in use,

Figure 3 is a front perspective view of the support of Figure 1 in use, and

Figures 4, 5 and 6 are similar views respectively of a second embodiment of the invention.

Referring now to figures 1 to 3 of the drawings, a spinal support 1 comprises a continuous strap 2 of a textile webbing material. The continuous strap 2 forms a pair of shoulder loops 4, 5 each of which extends in use from the lower back region of the user upwardly and forwardly around a respective side of the user to the front of a respective shoulder and then rearwardly over the shoulder to the upper back region. Below the shoulder loops 4 and 5 the strap 2 crosses over itself and continues downwardly to form a pelvic harness including a rear portion 6. The ends 7, 8 of the rear portion 6 of the strap 2 pass freely through a pair of conventional slidable buckles 9, 10 respectively and extend laterally to form the respective shoulder loops 4 and 5, thus defining the crisscrossing lower back portions 11, 12 of the continuous strap 2. The shoulder straps 4 and 5 are joined together at the centre of the upper back region, and are attached to the pelvic harness by a strap 14 passing down the

centre of the back. A flexible pad 13 is secured to the centre of the rear portion 6 and extends along the lower part of the spine partially up to the point where the shoulder loops 4 and 5 are joined at the upper back region. The strap 14 is sewn to the top end of the flexible pad 13 and to the centre of the rear portion 6, the free end 3 of the strap 14 passing through a buckle 15 which is attached to the shoulder loops 4, 5 at 16 in conventional manner. Thus, the flexible pad 13 is adjustably attached to the shoulder loops 4, 5.

The flexible pad 13 is formed of a textile webbing sleeve 17 having a filling of a suitable resilient rubber material (not shown). One face of the lower end 18 of the sleeve 17 is sewn to the centre of the rear portion 6 adjacent the strap 14 and the end 18 of the sleeve 17 is open so that the filling may be removed if desired and replaced with a rigid filling.

The crisscrossing back portions 11, 12 of the continuous strap 2 pass between the sleeve 17 and the strap 14, so that the crisscrossing back portions 11, 12 are maintained in the region of the sleeve 17.

Completing the pelvic harness are front straps 19 and 20 attached to the buckles 9 and 10 respectively at the opposite ends 7 and 8 of the rear portion 6 of the pelvic harness. The free end 21 of the front strap 19 carries a buckle 22 so that the front straps may be secured together. The support 1 also includes a separate waist band 23 which carries a buckle 24 for securing the waist band around a user's waist, to press against and hold the flexible pad 13 in the correct position.

In use, the support 1 is worn by a user 25 as illustrated in Figures 2 and 3. In particular, it will be apparent that the rear portion 6 and the front straps 19, 20 are anchored around the pelvic girdle and the flexible pad 13 extends adjacent the user's spine from the sacrum to the mid thoracic region. Further, it will be noted that the pressure exerted by the crisscrossing back portions 11, 12 on the flexible pad 13 may be varied by adjusting the positions of the buckles 9, 10 and 15 together with the tension which is applied to the front bands 19, 20. As the front bands 19, 20 are tightened together, and as the shoulder loops 4, 5 form a continuation of the rear portion 6 of the pelvic harness, the user's shoulders are pulled backwards to a position consistent with good bodily posture. More particularly, the user 25 of the support 1 is able to bend slightly in the forward and sideways directions as indicated by arrows A, B respectively. However, rotational movement of the torso of the user 25 is especially restrained when the spine is flexed since this is one of the movements which causes many spinal injuries.

A second embodiment of the invention is shown in figures 3 to 6. In these figures the same reference numerals have been used for parts which are the same or similar to parts in figures 1 to 3.

As in the case of the first embodiment, in this second embodiment the strap 2 again forms two shoulder loops 4 and 5 and continues below the waist band 23 to form a part of a pelvic harness. In this case, however, the waist band 23 is formed in three parts; a rear strap 30 of fixed length carrying

buckles 31 and 32 at each end, and two front straps 33 and 34 attached via the buckles 31 and 32 respectively to the opposite ends of the rear strap 30. An adjustable buckle 35 permits tightening of the waist band 23.

The straps 2 pass freely through the buckles 31 and 32 below the shoulder loops 4 and 5, and each end thereof is joined via a respective adjustable buckle 36, 37 to a pair of further straps 38 and 39 which are joined at 41 to the centre strap 14. In this embodiment the centre strap 14 is a downward continuation of the loop 4, the end of the other loop 5 being joined at the centre of the upper back region to the loop 4 by a further adjustable buckle 42.

In use the support is worn as shown in figures 5 and 6, from which it will be seen that below the waist band 23 the continuation of the strap 2 downwardly from the buckles 31 and 32 together with the straps 38 and 39 form a pelvic harness 40 which passes between the legs of the user thereby helping to maintain the pelvic harness 40 in the correct position around the pelvic girdle.

As before, a pad 13 is attached to the inside of the centre strap 14, and is pressed into contact with the spine by the waist band 23 and the centre strap 14. Overall adjustment is by the adjustable buckles 36, 37 and 42 which provide a variable rearward force to be applied to the user's shoulders by the shoulder loops 4 and 5.

It will be understood that the first embodiment of the invention may also have straps which pass between the legs to maintain the pelvic harness in the correct position. These straps would be attached to the end 18 of the sleeve 17 and would extend to the buckles 9 and 10.

It will be understood that the support 1 may be manufactured in a variety of sizes as required to accommodate various range of user measurements.

The advantages of the embodiments are as follows;

First, the buckles can be suitably adjusted to enable a uniform pressure to be exerted along the length of the flexible pad.

Second, the pressure exerted on the flexible pad can be readily varied by adjustment of the buckle positions.

Third, the spinal column extending from the nape of the neck to the pelvic girdle is readily held in a straight extended posture.

Fourth, due to its non rigidity, the support allows small torso movements thus substantially preventing muscle wasting. However, muscle and ligament damage is prevented since excessive movement of the spine is restricted. In particular, forward bending together with rotational movement of the torso is restricted by the use of the support.

Fifth, the support is useful for correcting conditions such as kyphosis and scoliosis.

Sixth, due to the small area of body contact, discomfort during warm weather is minimised.

It is envisaged that the invention will have general application where the following conditions exist and affect the spine of a person; rheumatic conditions, postural defect, sprains and displacement of intervertebral discs, post-operative conditions,

disease conditions resulting in weakening of the bones.

5 The invention is not limited to the embodiments described herein, which may be modified or varied without departing from the scope of the invention.

CLAIMS

- 10 1. A spinal support comprising a pelvic harness and a pair of shoulder straps each forming a loop extending in use from the lower back region of the user upwardly and forwardly around a respective side of the user to the front of a respective shoulder and then rearwardly over the shoulder to the upper back region, each shoulder strap at both the upper and lower back regions being attached to the pelvic harness for applying a rearward force on each shoulder.
- 15 2. A spinal support according to claim 1, wherein the pelvic harness includes straps which pass between the legs of the user.
- 20 3. A spinal support according to claim 1 or 2, wherein in the lower back region the shoulder straps are an upward continuation of at least part of the pelvic harness and are adjustable to provide an

adjustable force on the user's shoulders.

- 25 4. A spinal support according to claim 1, 2 or 3, wherein the shoulder straps are joined together at the centre of the upper back region, and are attached to the pelvic harness by a further strap passing down the centre of the back.
- 30 5. A spinal support according to claim 4, further including a waist band and a pad which is pressed against the lower part of the user's spine at least in part by the waist band.
- 35 6. A spinal support according to claim 5, wherein the pad is attached to the further strap.
7. A spinal support according to any preceding claim, wherein the straps are formed of a textile webbing.
- 40 8. A spinal support substantially as described with reference to figures 1 to 3 of figures 3 to 6 of the accompanying drawings.
9. Any novel integer or step, or combination of integers or steps, hereinbefore described and/or shown in the accompanying drawings irrespective of whether the present claim is within the scope of, or relates to the same or a different invention from that of, the preceding claims.
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